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# NEW FIRM SURVIVAL: A FUNDS FLOW MODEL APPROACH

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# New Firm Survival: A Funds Flow Model Approach

*Abstract*

This paper examines the influence of operating activities and financial and investment decisions in the start-up year on post-entry survival. Using a logit estimation of a funds flow model, we compare starters that failed within nine years with those that did not fail. We find that in the first year failed firms typically generate less cash flows, incur higher labour expenses, use more trade credit and financial debt, and limit inventories. Industry characteristics also significantly influence the survival probability. The timing of failure is mainly determined by the extent of financial debt and accounts payable in the first year.

**Key words**: funds flow, survival, bankruptcy

## *Introduction*

Newly founded firms have been credited with the creation of a disproportionate share of new jobs, innovation, economic flexibility and growth in the economy.[1] Because of these advantageous effects to the economy, public policy favours business start-ups encouraging them by means of grants and subsidies. On the other hand, the large number of business failures each year - especially of young firms[2] - and the implied economic and social consequences indicate the need to study the post-entry survival of business start-ups. While numerous studies have examined the ability of accounting data to classify failing and non-failing firms at the moment of failure (or at best a few years before the event), these studies typically restrict themselves to mature, established stock-exchange listed firms. Empirical research on the survival process in the post-entry period, on the other hand, has been limited partly due to the lack of data on small and medium sized enterprises.

The purpose of this paper is to determine empirically the influence of the operating activities and the financial and investment decisions in the start-up year on post-entry survival. In other words, we investigate whether the firm's cash flow generation, investments and financing in the start-up manner has an influence on its survival. We use a funds flow model approach for this purpose. The motivation for choosing this approach above the use of accrual-based financial ratios is twofold. First, most bankruptcy studies built on traditional financial ratios typically use brute empiricism to choose financial ratios for their model (Ball and Foster (1982)). According to Gentry et al. (1985), a funds flow based model can overcome this shortcoming. Second, Aziz et al. (1988) suggest that funds flow models may allow to detect a bankruptcy earlier as compared to models based on traditional ratios.

Our sample consists of 823 start-ups in 1985, which we observe through 1994. Prior studies of post-entry survival are based on small datasets. Laitinen (1992), for example, used

40 observations (20 failed with 20 matched non-failed enterprises). He concludes that it is possible to some degree to predict the failure of a newly founded firm already in the first year after foundation, but recognises that an important role for future research is to use large samples to validate this result. This study examines a large sample of 823 newly founded firms in the Belgian economy, 115 of them failed while 708 survived through 1994. Compared to other studies that tend to use matched samples of failed and non-failed firms, our data does not suffer from the choice-based sample selection bias that has been attributed to most bankruptcy studies where the sample includes too many distressed firms compared to their frequency rate in the population (Zmijewski (1984)). Our study further distinguishes itself from prior work by specifically acknowledging the importance of industry-specific factors that may contribute to the firm's survival. The industrial organisation literature has documented the influence of industry specific characteristics such as minimum efficient scale, concentration and technological regime on post-entry performance (Audretsch (1995), Wagner (1994), Winter (1984)).

The remainder of this paper is structured as follows. The next section presents the funds flow model that is used to study the impact of first-year firm specific characteristics. Our hypotheses are presented in the third section. Next, we describe the sample, followed by the model estimation results. The last section concludes the paper.

## *Funds Flow Model Development*

There are three main funds flow categories: the operating cash flow, the financing and investment funds flows and the funds flows from working capital. The discriminating power of each of these components has been examined in prior studies.[3] Casey and Bartczak (1985), for example, found that operating cash flow ratios have incremental predictive power over

accrual-based ratios as predictors of financial failure although the classification accuracy is lower for the first category of ratios. This smaller classification accuracy can be explained by the adjustments to the working capital components, allowing firms to smooth their operating cash flow. Laitinen (1994) found that firms approaching failure seem to keep their operational cash flow artificially high by decreasing inventories and accounts receivable and by insisting on earlier payments and advances from debtors. Gentry et al. (1985), (1987) found that the other elements of working capital are not statistically significant for predicting financial failure. With respect to the investing and financing funds flows, higher capital expenditures result in a higher survival probability, ceteris paribus (Aziz et al. (1988), Aziz and Lawson (1989), Gentry et al. (1987)). Moreover, surviving firms are also able to carry more debt (Aziz et al. (1988), Aziz and Lawson (1989)) and pay higher dividends (Gentry et al. (1985), (1987)).

The model developed in this study is based on the cash-based funds flow model used in Gentry et al. (1987), hereafter referred to as the GNW model. The GNW model consists of twelve components: operations, accounts receivable, inventory, other current assets, accounts payable, other current liabilities, financial, fixed coverage expenses, capital expenditures, dividends, other asset and liability flows, and the change in cash and marketable securities. We expand the GNW model in two major ways.

First, we decompose the GNW operating cash flow component. Cash flows from operations may influence survival either through the income created through gross margin,[4] or through the distribution of these funds. In other words, even if a sufficient level of gross margin has been achieved, the distribution of these funds to wages and other expenses can lead to financial distress. While the GNW model incorporates the distribution of funds to the owners and debtholders, it does not explicitly model the distribution to personnel. Our model, on the other hand, decomposes the GNW operating cash flow component into three

components: gross margin (GMARGIN), labour expenses (LABOUR) and a residual component (FOPRES) that includes other operating expenses and income from extra-ordinary and non-operating activities.

The second major change to the GNW model is the decomposition of the financing funds flow into two subparts: equity (FEQ) and financial debt (FDEBT).[5] In failure prediction models based on traditional financial ratios, capital structure has been found to be an important determinant of failure (e.g., Beaver (1966), Altman (1968), Zavgren (1985)). While typically ignored in funds flow models, we explicitly capture capital structure elements in the model.

Finally, some minor adaptations to the definitions of the funds flow components from working capital were needed in order to accommodate the reporting requirements for the small and medium sized firms in our sample.

These changes lead to the following funds flow equation:

$$\underset{S(+)}{GMARGIN_t} + \underset{U(-)}{LABOUR_t} + FOPRES_t + \underset{U(-)}{FCAP_t} + \underset{S(+)}{FDEBT_t} + \underset{S(+)}{FEQ_t} +$$

$$\underset{U(-)}{FCE_t} + \underset{U(-)}{FDIV_t} + \underset{U(-)}{FINV_t} + \underset{U(-)}{FAR_t} + \underset{S(+)}{FAP_t} + \underset{U(-)}{FCC_t} + FOTHER_t = 0,$$

where GMARGIN = gross margin, LABOUR= labour expenses, FOPRES= residual cash flow, FCAP = fixed investments, FDEBT= financial debt, FEQ= equity, FCE = fixed coverage expenses, FDIV = dividends, FINV = inventories, FAR = accounts receivable, FAP = accounts payable, FCC = cash and marketable securities, FOTHER = other current liabilities and assets.[6] Sources (S) are a positive number and uses (U) are a negative number. The most likely sign for each funds flow component in the year of start-up is indicated underneath each variable. $FOPRES_t$ and $FOTHER_t$ contain both cash outflows and inflows.

By dividing each funds flow component by the total sources/uses, the share of each component in the total funds flows can be determined for each firm and the sum of the total net inflows (=sources) always exactly matches the absolute value of the sum of total net outflows (=uses).[7]

## *Hypotheses*

The funds flow model will be estimated using a logit methodology. In this section we develop the hypotheses, which are presented in Table 1, that will be tested.

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insert Table 1 here
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*Operating cash flow variables*

It has been argued that liquidity constraints play a major role in business start-ups and entrepreneurial survival. Because of moral hazard and adverse selection problems, capital markets provide too little capital to entrepreneurs, who must bear most of the risks inherent in their venture (Knight (1921)). Stiglitz and Weiss (1981) argue that entrepreneurs cannot even borrow in the credit market to attain their profit-maximising levels of capital. Hence, it has been shown that the likelihood of becoming an entrepreneur is much larger for individuals with substantial assets (Evans and Leighton (1989), Evans and Jovanovic (1989), Holtz-Eakin et al. (1994a) (1994b), and Blanchflower and Oswald (1990)), and the likelihood of success also increases accordingly. Additionally, van Praag and van Ophem (1994) found that there are few entrepreneurial ability aspects that can compensate for a lack of capital.

Therefore, firms that are able to generate more operating cash flows in the first year should have greater chances of survival: internally generated funds can alleviate capital constraints. Because of information asymmetries, which are larger for business start-ups,

internally generated resources are also the cheapest financing source (Myers (1984)). In addition, these firms can prove to external capital providers that they are sound, opening alternatives for subsequent external financing. Hence, firms that generate a higher gross operating margin (GMARGIN) should have better survival prospects. Furthermore, firms that generate income from other activities (included in FOPRES) will have an even larger buffer to withstand failure. Finally, firms that can limit their labour expenses (LABOUR) can reserve more resources for future investments ceteris paribus, again mitigating liquidity constraints.[8]

*Financing and investment funds flows*

Firms that start up with relatively more equity (FEQ) are less vulnerable to repayment problems and unfavourable changes in the industry.[9] Hence these firms are more likely to survive. Unlike equity, debt implies the obligation of periodic interest payments and capital instalments. These fixed obligations can weigh very high on the new firm, especially if it is not able to generate budgeted revenues, causing the ultimate failure of the firm (Laitinen (1992)). Debt obligations can also lead to the postponement of investments which are necessary for the long run survival of the firm.

The payments to the owners and debtholders in the year of start-up are incorporated in our model. While firms that file for bankruptcy tend to pay lower dividends in the year prior to bankruptcy (Gentry et al. (1985), (1987)), this hypothesis is not likely to hold for the start-up year. We expect that all firms pay low dividends in the start-up year. However, the motivation will be different between the two types of firms. Sound firms will retain their profits for future investments, while illiquid firms do not have sufficient funds to pay out dividends. Therefore, we do not expect to find a significant difference for the dividend (FDIV) variable.

Finally, firms with high fixed coverage expenses (FCE) should have a higher failure probability. If banks can estimate the credit risk of starting firms, lower credit quality should be compensated with a higher risk premium and thus interest rate for a given level of debt (controlled for by FDEBT). On the other hand, when a larger part of the funds flows to the debtholders, less can be retained for future investments, thereby lowering the survival prospects.

Part of the internal and external provided funds will be invested in tangible and intangible assets (FCAP). For a given proportion of expenses, those firms that invest less are expected to have a higher failure probability. In addition, to the extent that part of these investments are firm-specific, they represent a barrier to exit (Cabral 1995).

*Working capital flows*

By the funds flow relation specified above, the investment and financing funds flows and the cash flows are directly related to the working capital needed for daily activities. Liquidity constrained firms have greater incentives to limit their investments in working capital. Therefore, they restrain inventories (FINV), limit trade credit to customers (FAR) and are less able to put aside some cash and marketable securities (FCC). In addition, liquidity constrained firms use trade credit granted (FAP) by their creditors as much as possible. This expensive source is often used by failing firms when alternative credit from financial institutions is unavailable (Petersen and Rajan (1997)).

*Control variables*

Next to the funds flow components, two additional variables are introduced into the model to control for the effects of size and industry. First, starting firm size may influence the survival probability of the firm. Most new firms start up at such a small size that they are

faced with severe cost disadvantages (Evans (1987), Hall (1987)). These disadvantages tend to be larger when there are considerable scale economies in the industry (Audretsch (1995)). Hence, we expect a negative relationship between initial size and the failure probability. We measure size by the logarithm of total assets (LOGSIZE), which has been found to be to be highly discriminatory in failure prediction models (e.g. Ohlson (1980)). GNW use total funds flows relative to total assets to measure size. This latter variable, which captures the rotation of financial resources, may measure efficiency rather than size.

Second, it has been shown that the failure rate is industry-specific. Industry characteristics that influence the success rate include scale economies (Audretsch and Mahmood (1995)), sunk costs (Caves and Porter (1976)), barriers to entry (Kessides (1986)), concentration ratio (Wagner (1994)), profit margins (Weiss (1989)), industry growth (Bradburd and Caves (1982)), among others. In order to keep the estimated multivariate model as parsimonious as possible we attempt to control for these industry effects using a single variable: the industry exit rate. The industry exit rate is defined as the number of firms exiting in a given calendar year divided by the total number of firms in the industry in the prior year. Dunne et al. (1988) report that industry exit rates are stable over time. To avoid endogeneity problems, we use the historical exit rate observed in 1985 (EXIT85).

## *Data Description*

### *Sample Description*

We use accounting data in the start-up year for a sample of Belgian companies that were founded in 1985. This sample could be constructed because of the legal requirement whereby virtually all firms must file annual financial statements with the Belgian National Bank. The firms in our study were selected on the basis of several criteria. First, we limited

the start-up dates to the 8-month period March-October 1985. Given that economic conditions are significant determinants of new firm survival (Platt and Platt (1994)), we hereby control for business cycle effects. Next, only firms that reported personnel sometime from start-up onwards until their failure or - in case they survived - until 1994 were included. Through this restriction we exclude firms that were founded solely for tax incentives.[10] Financial institutions, insurance companies, exchange brokers and hospitals are subject to special accounting rules and are therefore not included in the sample.

The start-up date is defined by the issuance of a new VAT number. Exit is determined by the moment of suspension of the VAT number. Firms that exited through bankruptcy or concordat are classified as failed firms. In Belgium *bankruptcy* is a matter of illiquidity, not of insolvability: the courts can pronounce merchants or business corporations whose claimable liabilities exceed their available assets, and who have suspended payments against creditors, bankrupt. C*oncordat*, on the other hand, allows a debtor to avoid bankruptcy and the accompanying loss of rights in case the firm was originally viable and the debtor isn't to blame for the situation in which he finds himself. Under concordat, the liquidity problems are deemed temporary. Most concordats in our sample included a renunciation of property for the benefit of creditors. A liquidator then sells the assets and divides the proceeds among creditors. Compared to liquidation in case of bankruptcy, there is no dispossession and the completion of bankruptcy proceedings passes off much smoother. Firms that exited through mergers or acquisitions were excluded from the sample.

The final sample consists of 823 firms. By December 1994, 115 firms are classified as failed, the remaining 708 enterprises are classified as survivors. Only 14% of the sampled starters fail. This figure is lower than the figures typically reported in the popular press, due to the construction of our sample. Specifically, firms that do not file financial statements and

that do not report employment have higher failures rates. These firms have been eliminated from the sample due to lack of data.

The data include both manufacturing and service industries. In fact, the 823 firms belonged to 126 different industries (categorisation is based on the 3-digit industry NACE-code). The five most represented sectors are construction (41 firms), restaurants (39), food retailers (32), business service firms (30) and textile retailers (28).

Table 2 presents the age distribution of the failed firms. The number of failures for start-ups is highest in the second and third year and decreases afterwards. However, this decrease is not monotone. Similar age patterns were reported in Audretsch and Mahmood (1995) and Troske (1989).

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*Explanatory Variables*

The explanatory variables of the model were collected for each firm's start-up year. Since the length of the first accounting varied across firms,[11] a correction was made to the income statement in order to scale it to a length of one year. Table 3 reports the mean, median and standard error for each funds flow component and control variable for the subsamples of failed and surviving firms. The last column reports the nonparametric Kruskal-Wallis test statistic for differences between the two groups.

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insert Table 3 here
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For most of the variables - except for FCE, FDIV, FOPRES and FCC - the standard deviation is larger in the group of failed firms, a result which had already been found in the first study by Beaver (1966). The means of both groups have the same sign and their sign

corresponds to the expected signs for sources (+) and uses (-), as expressed in equation (1). Prior studies have found that failed firms tend to exhibit, on average, different behaviour in the year prior to failure. For example, Gentry et al. (1987) found that prior to failure, firms tend to disinvest in working capital. Our findings, as expected, indicate that this difference between failed and non-failed firms is less apparent in the year of start-up. The results of the Kruskal-Wallis test indicate that only the proportional funds from gross margin, accounts payable and liquid assets are significantly different at the 5% level between the failed and non-failed firms. At the 10% level, the industry exit rate is different for failed firms. For these variables that are significantly different between the failed and non-failed group, the signs of the differences correspond to the hypotheses set forth in Table 1. Firms that fail within the first 9 years generate less gross margin and fund their operations more with accounts payable in their first year of operation. They also have less liquid assets at their disposal. As expected, failed firms operate in industries that have higher exit rates.

## *Multivariate Analysis*

We use a multivariate logit model to determine which variables are significant in determining the survival for starting firms. The multivariate logistic regression explicitly allows for interrelationships among variables. The estimated coefficients and asymptotic p-values are presented in Table 4. Model A examines the impact of the explanatory variables on the probability of failure whereas model B examines the impact of the explanatory variables on the probability of early relative to late failure. To avoid overidentification in the estimation procedure, we omit the FOTHER component from the funds flow model. We discuss each model in turn.

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insert Table 4 here
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The results of model A show that, except for FCE (which is not statistically significant), all coefficients have the expected sign. Firms with a high gross operating margin relative to their total sources (GMARGIN) in the year of start-up have significantly higher probability of survival. The operating margin lies at the heart of the business and forms the basis to remunerate all deployed resources. Therefore, it is necessary to generate a minimum value added in the long run, ceteris paribus. Income generated beyond the normal business activities (FOPRES) is also a significant determinant of survival. Failed firms not only generate less operating margin, they also have significantly higher labour expenses (for a given capital intensity).

The second category of funds flow variables represents the firm's financing sources. The proportion of funds obtained from equity (FEQ) in the start-up year does not significantly impact the failure probability of the firm. However, as expected, failed firms obtain a significantly higher proportion of their funds from financial (bank) debt (FDEBT). Recall that, for a given level of financial debt, failed firms pay similar interest expenses and use other more expensive sources of financing such as accounts payable more extensively. Overall, these results are consistent with the findings reported by Laitinen (1992) who found that failed newly founded firms have difficulty in generating cash flows, which leads them to use more outside financing in the first few years.

Their distribution to debtholders (FCE) and equity holders (FDIV) is not significantly higher. In other words, for a given level of debt, failed firms did not incur higher debt servicing costs than the non-failed firms. Given that very few firms pay dividends in the first year (only 31 out of 823), this coefficient was not expected to be significant. Lastly, the

proportion of funds allocated to fixed investments (FCAP) in the first year does not influence post-entry survival.

Finally, a firm's use of working capital may also contribute to its success. The results indicate that in the start-up year failed firms significantly use trade credit granted by their creditors (FAP) more extensively and invest less of their funds in inventories (FINV). Thus, firms that are not forced to use expensive trade credit nor to control their inventory levels have a higher survival probability. These results suggest that failed firms compensate their shortage of start-up capital by controlling their working capital. The liquidity problems are further illustrated by their significantly lower proportion of funds invested in cash (FCC) in the start-up year. Hence, firms that are able to keep a larger safety margin by holding a portion of their funds in cash to pay off due debt and/or other obligations face a higher survival probability.

Failed firms do not grant significantly less trade credit to customers (FAR). The reason may be that starting firms have not yet built up a reputation that enables them to deviate from industry standards. Therefore, liquidity constrained starting firms may not be able to impose stricter restrictions than the average credit limits of the industry.[12]

With respect to the control variables we find, surprisingly, that firm size does not have a significant impact. Ceteris paribus, the probability of new firm failure is significantly higher in highly turbulent industries. In other words, while firm-specific characteristics play a significant role, exogenous industry characteristics also contribute to the survival prospects. This finding indicates that industry characteristics should be taken into account in failure prediction models.

Overall, the conclusions from the results reported for Model A are that failed new firms typically have difficulty generating cash flows in the first year, and at the same time have to pay out more of their funds as labour expenses. To compensate for this liquidity

problem they use trade credit granted by creditors more extensively and limit tying up funds in inventories. Despite that they obtain more of their funds from financial debt compared to non-failed firms, the former do not incur a higher proportion of interest expenses. These results are obtained after controlling for industry-specific factors.

Using model A with data on the start-up year, the logit technique correctly identified 55.7% of the failed and 76.1% of the survivors, with an overall classification accuracy of 73.2%. Not surprisingly, our model's classification accuracy is lower than models that predict failure using information close to the time of failure. For example, the GNW model correctly predicts 79% of failures and 88% of the non-failures based on information taken one year before failure. In contrast, our study uses information available at the start-up, which is one to nine years before failure. Moreover, other studies of new firms generally report results more comparable to ours. The multivariate models in Laitinen (1992), for example, correctly predict 70% of the failures and 75% of the non-failures in the year after foundation. Furthermore, he shows that the predictive accuracy increases as the date of failure approaches. While the predictive accuracy of our model is low,[13] it is not without merit. Specifically, over ¾ of the survivors were classified correctly. In other words, our model is more useful in classifying survivors than failures. This is also useful information to financial institutions that grant loans to starting firms.

Model B examines the impact of the explanatory variables on the timing of failure. For all the firms that were classified as failed, we investigate whether the funds flows in the first year influence the duration of the firm. Based on the distribution of age across failed firms reported in Table 2, we classified early failure as occurring within 4 years, which is when the annual number of failures was highest, and late failures occurring after 5 years.[14] This model does not include the FDIV variable: given that none of the late failed and only 4 of the early failed paid dividends, the inclusion of this variable resulted in estimation problems.

The results indicate that, for those firms failing within the first 9 years, the timing of failure is significantly affected by several factors. Firms that fail early obtain a significantly higher proportion of their funds from accounts payable (FAP) and financial debt (FDEBT), and are also significantly smaller (LOGSIZE). Hence, failure is expedited when firms are burdened with expensive sources of financing. Laitinen (1994) also found that accounts payable are increased in the last phase of the failure process. In addition, firms that fail early are significantly smaller (LOGSIZE). This result is consistent with other studies that have found size to be a significant determinant of failure (Hall (1987), Evans (1987)). Our results further show that while gross margin, extra-ordinary income, labour expenses, investments in inventories and liquid assets and the industry exit rate significantly affect the probability of failure, they do not have an impact on the timing of the failure.

The results of model A and B are consistent with the failure process described by Laitinen (1992). He stresses that it is the unexpected insufficiency of revenue financing that causes the beginning of the failure process. As the firm is not able to generate the planned amount of revenues, it is forced to take more and more debt to survive. Thereafter the firm must budget for more and more revenues to pay its increased financial obligations, a vicious circle that may finally end in failure. Indeed when comparing model A and B, we see that both early and late failing firms have problems in generating sufficient cash flows. However, during the first year of start-up, firms that fail early have already appealed more to external debt, i.e. financial debt as well as trade credit.

## *Conclusion*

The objective of this study was to examine whether publicly available information about the sources and uses of funds in the first year of operation is indicative of the firm's survival prospects. Using a logit estimation of an extended funds flow model on a sample of 823 new firm start-ups over an eight-month period we found some significant differences in the start-up year between those firms that failed within nine years and those that did not. Specifically, failed new firms typically have difficulty generating cash flows in the first year, and at the same time are faced with higher labour expenses. To compensate for this liquidity problem they use trade credit granted by creditors more extensively and limit inventories. Despite that they obtain more of their funds from financial debt compared to non-failed firms, the former do not incur a higher proportion of interest expenses. Another important determinant of failure is the industry in which the firm operates.

We also examined which firm-specific factors observed in the first year affect the timing of failure. Our results indicate that failure occurs sooner for smaller firms and when the first year of operations is funded more extensively with trade credit and financial debt.

Table 1: Hypotheses for the funds flow components and control variables

| *Variable (Source +/ Use -)* | *Expected sign (predicting failure)* |
|---|---|
| Cash flow variables | |
| GMARGIN (gross operating margin) (+) | - |
| LABOUR (labour expenses) (-) | - |
| FOPRES (other operating results) (+/-) | - |
| Financing and investment funds flows | |
| FEQ (Equity financing) (+) | - |
| FDEBT (Financial debt) (+) | + |
| FDIV (dividends) (-) | ? |
| FCE (interest paid on leases and debt) (-) | - |
| FCAP (investment funds flows) (-) | + |
| Working capital variables | |
| FINV (Inventory) (-) | + |
| FAR (Accounts receivable) (-) | + |
| FAP (Accounts payable) (+) | + |
| FCC (Cash and other marketable securities) (-) | + |
| FOTHER (Other current assets -other current liabilities) (+/-) | ? |
| Control variables | |
| LOGSIZE | - |
| EXIT85 | + |

Table 2: Age distribution of the failed firms

| *Year* | *Total number of failures* | *Percentage of total failures* | *Probability of failure conditional on survival* |
|---|---|---|---|
| 1986 | 2 | 1.74% | 0.0024 |
| 1987 | 29 | 25.22% | 0.0366 |
| 1988 | 27 | 23.48% | 0.0353 |
| 1989 | 19 | 16.52% | 0.0255 |
| 1990 | 4 | 3.48% | 0.0054 |
| 1991 | 10 | 8.70% | 0.0137 |
| 1992 | 5 | 4.35% | 0.0069 |
| 1993 | 6 | 5.22% | 0.0083 |
| 1994 | 13 | 11.30% | 0.0184 |

Table 3: Data description for failed and non-failed firms

| | *Failed firms* | | | *Sound firms* | | | |
|---|---|---|---|---|---|---|---|
| | *mean* | *median* | *std. error* | *mean* | *median* | *std.error* | *Wilcoxon* |
| GMARGIN (S) | 0.2634 | 0.2714 | 0.3035 | 0.3712 | 0.3613 | 0.2404 | 0.0002** |
| LABOUR (U) | -0.2447 | -0.2112 | 0.1987 | -0.2388 | -0.2001 | 0.1793 | 0.9498 |
| FOPRES (S/U) | -0.0287 | -0.0039 | 0.1344 | -0.0235 | -0.0085 | 0.1511 | 0.2215 |
| FEQ (S) | 0.1519 | 0.1021 | 0.1823 | 0.1365 | 0.0986 | 0.1523 | 0.9582 |
| FDEBT (S) | 0.1824 | 0.0917 | 0.2077 | 0.1513 | 0.0826 | 0.1847 | 0.1710 |
| FDIV (U) | -0.0013 | 0 | 0.0090 | -0.0017 | 0 | 0.0114 | 0.8591 |
| FCE (U) | -0.0158 | -0.0098 | 0.0185 | -0.017 | -0.0087 | 0.0224 | 0.6554 |
| FCAP (U) | -0.2909 | -0.2661 | 0.2416 | -0.3241 | -0.2749 | 0.2396 | 0.1107 |
| FINV (U) | -0.1133 | -0.0381 | 0.1674 | -0.1142 | -0.0442 | 0.1511 | 0.6978 |
| FAR (U) | -0.1567 | -0.1124 | 0.1843 | -0.1472 | -0.1018 | 0.1652 | 0.9934 |
| FAP (S) | 0.2246 | 0.1699 | 0.2091 | 0.1764 | 0.1118 | 0.1890 | 0.0121** |
| FCC (U) | -0.0516 | -0.0246 | 0.0677 | -0.0780 | -0.0521 | 0.0815 | 0.0001** |
| FOTHER(S/U) | 0.0809 | 0.0503 | 0.1999 | 0.1091 | 0.0732 | 0.1833 | 0.2597 |
| LOGSIZE | 8.3712 | 8.3775 | 1.5808 | 8.5943 | 8.4983 | 1.2342 | 0.4293 |
| EXIT85 | 0.1814 | 0.1450 | 0.1733 | 0.1599 | 0.1125 | 0.1408 | 0.0656* |

(S) = source, (U) = use of funds
** significant at the 95% confidence level
* significant at the 90% confidence level

Table 4: Multivariate logit estimates

| | *Model A: probability of failure 115 failed firms 708 non-failed firms* | | *Model B: Probability of early vs. late failure 77 early failed firms 38 late failed firms* | |
|---|---|---|---|---|
| | *estimated coefficient* | *p-value* | *estimated coefficient* | *p-value* |
| INTERCEPT | -0.5520 | 0.6290 | 6.7400 | 0.0208** |
| GMARGIN | -4.5435 | 0.0001** | -2.7704 | 0.1748 |
| LABOUR | -3.8391 | 0.0057** | -3.6325 | 0.2787 |
| FOPRES | -4.2250 | 0.0007** | 0.4008 | 0.8792 |
| FEQ | -0.3043 | 0.7434 | -1.1688 | 0.5953 |
| FDEBT | 1.3535 | 0.0948* | 4.3921 | 0.0517* |
| FDIV | -0.7194 | 0.9451 | | |
| FCE | 9.0392 | 0.1844 | 28.7328 | 0.1166 |
| FCAP | 1.2290 | 0.1976 | 2.5268 | 0.2613 |
| FINV | 1.9961 | 0.0741* | 3.7770 | 0.1442 |
| FAR | 1.1533 | 0.2893 | 1.0050 | 0.7069 |
| FAP | 1.4373 | 0.0743* | 5.1501 | 0.0208** |
| FCC | 5.1054 | 0.0085** | 1.4997 | 0.7298 |
| LOGSIZE | -0.0300 | 0.7607 | -0.5985 | 0.0152** |
| EXIT85 | 1.3690 | 0.0396** | -3.7402 | 0.1355 |

** significant at the 95% confidence level
* significant at the 90% confidence level

## *Footnotes*

[1] See e.g., Birch (1979), Armington and Odle (1982), Kamien and Schwartz (1982) and Swain (1985).

[2] See e.g., Acs and Audretsch (1993), Audretsch (1991), Phillips and Kirchhoff (1989) and Mata and Portugal (1994).

[3] Casey and Bartczak (1985) and Laitinen (1994) include working capital components in their definition of operational cash flow.

[4] Gross operating margin results from the difference between operating revenues and the costs of goods and services delivered by third parties. It reflects whether the firm adds value to purchased goods and services.

[5] In the accounting practices followed the borderline between short term and long term debt is made at one year, so we were unable to study the impact of short term versus long term financial debt on the probability of failure.

[6] A detailed description of the different funds flow components based on the Belgian annual accounts is available from the corresponding author.

[7] One could argue that the total funds flow is rather unstable, so that it would be better to divide each funds flow component by total assets rather than by total funds. However, in the first year, total assets and total funds flow are highly correlated (correlation = 0.91).

[8] This hypothesis does not imply that failure rates are higher in labour intensive firms. Capital intensity is controlled by for the variable FCAP.

[9] For example, Opler and Titman (1994) found that the market value of equity of highly leveraged firms drops significantly more than that of low levered firms once the industry is confronted with a downturn.

[10] Other restrictions were imposed on the sample firms. Firms that invested over half of their funds in liquid assets were also excluded from the sample since it is likely that their operations did not start until the second year. Likewise, firms without operational activities during their first accounting year, i.e. without reported sales or labour remuneration, were excluded. Firms that had corporate owners within two years of start-up were also excluded as these firms were likely to be spin-offs. Lastly, firms with financial statements which contained errors for the first accounting year were also deleted from our database. Overall, the number of firms with errors in their financial accounts is small (66 firms of which 7 failed and 57 survived) compared to the total sample size. Discarding firms with reporting errors did not materially affect the default rates of the sample.

[11] The median length of the first accounting year is 447 days. The results of our study did not change when firms with a very short or very long first accounting year were eliminated from the data.

[12] While it can be argued that accounts receivable could be sold to a financial institution, this technique is hardly used by Belgian enterprises (Donckels et al. (1987)).

[13] As discussed in Laitinen (1992), small and starting business failures have been attributed to non-quantifiable data, such as management competency, that is not reported in financial statements.

[14] Changing the definition of early vs. late by one or two years did not change the results of Model B. Results are available from the corresponding author upon request.

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